Ministry of Agriculture of the Russian Federation
Federal State Budgetary Educational Institution
of Higher Education
"St. Petersburg State University of Veterinary Medicine"

APPROVED BY
Vice-Rector for Educational
Work and Youth Policy
____________ Sukhinin A.A.
May 6, 2024

Department of General, Private and Operative surgery

EDUCATIONAL WORK PROGRAM

for the discipline

" VETERINARY RADIOLOGY"

The level of higher education
SPECIALIST COURSE

Specialty 36.05.01 Veterinary Medicine
Full-time education
Education starts in 2024

Reviewed and adopted
at the meeting of the department
on May 2, 2024.
Protocol No. 9

Head of the Department
of General, Private and Operative surgery,
Doctor of Veterinary Medicine, Docent
____________ Nechaev A.Yu.

Saint Petersburg
2024

1. GOALS AND OBJECTIVES OF DISCIPLINE

The main goal in training a veterinary specialist in the discipline "Veterinary Radiology" is to give graduates theoretical knowledge, practical skills and abilities in the application of X-ray diagnostic methods for surgical, obstetric and internal non-communicable diseases of animals.

To achieve this goal, it is necessary to solve the following tasks:

a) The general educational task is to in-depth familiarize students with the mechanisms of action of various factors of physical nature, on the basis of which methods for x-ray diagnostics of animal diseases have been developed and provides fundamental biological education in accordance with the requirements for higher educational institutions of biological profile.

b) The applied problem covers issues related to the technology of organizing and conducting x-ray diagnostics of animal diseases and creates a conceptual basis for the implementation of interdisciplinary structural and logical connections in order to develop medical thinking skills.

c) The special task is to familiarize students with modern trends and methodological approaches used in radiology to solve problems in animal husbandry and veterinary medicine, as well as existing achievements in this area.

2. LIST OF PLANNED MASTERING RESULTS BY DISCIPLINE (MODULE), CORRELATED WITH THE PLANNED RESULTS OF MASTERING THE EDUCATIONAL PROGRAM

As a result of mastering the discipline, the student prepares for the following types of activities, in accordance with the educational standard of the Federal State Educational Standard for Higher Education 36.05.01
"Veterinary medicine".

Area of professional activity:
13 Agriculture

Types of professional activity tasks:

- Medical;
- Expert control;
- Scientific and educational.

Student competencies formed as a result of mastering the discipline

Studying the discipline should form the following competencies:

a) Professional competencies (PC):

PC-2 Able to develop animal research programs and conduct clinical studies of animals using special (instrumental) and laboratory methods, including to clarify the diagnosis (PC-2).

- **PC-2$_{ID-1}$**Be able to conduct animal research using digitalequipment and using special (instrumental) methods, including endoscopy, probing, catheterization, radiography, electrocardiography, echography

- **PC-2$_{ID-2}$**Be able to interpret and analyze special data(instrumental) methods for studying animals to verify the diagnosis

- **PC-2$_{ID-7}$**Know the indications for the use of digital equipment and special(instrumental) and laboratory methods for studying animals in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals

- **PC-2$_{ID-8}$**Know the rules for safe work with digital equipment, instruments and equipment used when conducting special (instrumental) studies of animals, including when conducting x-ray studies

- **PC-2$_{ID-9}$**Know the techniques for conducting animal research usingdigital equipment and special (instrumental) methods in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals
- **PC-2$_{ID-10}$**Know the methods and techniques for introducing diagnostic and radiopaque agentssubstances into the animal's body

3. THE PLACE OF DISCIPLINE IN THE STRUCTURE OF THE MPEP

Discipline B1.V.04 "Veterinary Radiology" refers to the part formed by participants in educational relations of the federal state educational standard of higher education in the specialty 36.05.01 "Veterinary Medicine" (specialty level).

Mastered by full-time students in the 10th semester.

To study this discipline, a student must have a full range of knowledge and skills in the anatomy of domestic animals, cytology, physiology, clinical diagnostics, and surgery. The study of the discipline "Veterinary Radiology" is preceded by the study of the following disciplines: anatomy, pathological anatomy, clinical diagnostics, internal non-communicable diseases, clinical pharmacology, operative surgery.

4. SCOPE OF THE DISCIPLINE "Veterinary radiology"

4.1. Scope of the "Veterinary Radiology" discipline for full-time study training

Type of educational work	Total hours	Semesters
		10
Classroom lessons (total)	**24**	**24**
Including:		
Lectures, including interactive forms	8	8
Practical exercises (PP), including interactive forms, including:	16	16
Practical training (PT)	4	4
Independent work (total)	**48**	**48**
Type of intermediate certification (test, exam)	**Test**	**Test**
Total labor intensityhours/credits	**72/2**	**72/2**

5. CONTENT OF THE DISCIPLINE "Veterinary Radiology"

5.1. Contents of the discipline "VETERINARY RADIOLOGY" for full-time study

No.	Name	Formed competencies	Semester	Types of educational work, including independent student work and labor intensity (in hours)			
				L	PP	PP	IW
1.	Introduction to Veterinary Medicine radiology. Nature and properties of X-rays. Qualitative and quantitative characteristics of X-rays. X-ray diagnostic methods (fluoroscopy and radiography).	Able to develop animal research programs and conduct clinical studies of animals using special (instrumental) and laboratory methods, including to clarify the diagnosis (PC-2). - PC-2_{ID-1}Be able to study animals usingdigital equipment and using special (instrumental) methods, including endoscopy, probing, catheterization, radiography, electrocardiography, echography - PC-2_{ID-2}Be able to interpret and analyze dataspecial (instrumental) methods for studying animals to verify the diagnosis - PC-$2_{ID\ -7}$Know the indications for using digital equipment andspecial (instrumental) and laboratory methods for studying animals in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-$2_{ID\ -8}$Know the rules for safe work with digital equipment, instruments and equipment used when conducting special (instrumental) studies of animals, including when conducting x-ray studies - PC-2_{ID-9}Know the technique of conducting animal research withusing digital equipment and special (instrumental) methods in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-$2_{ID\ -10}$Know the methods and techniques for administering diagnostic andradiopaque substances into the animal's body	10	2	-	-	2

2.	X-ray diagnostic units and attachments to them (classification, characteristics and principles of working with them). Safety rules for working in the radiology room and handling x-ray equipment. Personal means of protection against radiation radiation.	Able to develop animal research programs and conducting a clinical study of animals using special (instrumental) and laboratory methods, including to clarify the diagnosis (PC-2). - PC-2_{ID-1}Be able to study animals usingdigital equipment and using special (instrumental) methods, including endoscopy, probing, catheterization, radiography, electrocardiography, echography - PC-2_{ID-2}Be able to interpret and analyze dataspecial (instrumental) methods for studying animals to verify the diagnosis - PC-2_{ID-7}Know the indications for using digital equipment andspecial (instrumental) and laboratory methods for studying animals in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-2_{ID-8}Know the rules for safe work with digital equipment, instruments and equipment used when conducting special (instrumental) studies of animals, including when conducting x-ray studies - PC-2_{ID-9}Know the technique of conducting animal research withusing digital equipment and special (instrumental) methods in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-2_{ID-10}Know the methods and techniques for administering diagnostic andradiopaque substances into the animal's body	10	-	2	-	4

3.	Techniques typical styling animals depending on the subject of shooting in direct, lateral and oblique projections. X-ray shooting conditions.	V	Able to develop animal research programs and conducting a clinical study of animals using special (instrumental) and laboratory methods, including to clarify the diagnosis (PC-2). - $PC\text{-}2_{ID\text{-}1}$Be able to study animals usingdigital equipment and using special (instrumental) methods, including endoscopy, probing, catheterization, radiography, electrocardiography, echography - $PC\text{-}2_{ID\text{-}2}$Be able to interpret and analyze dataspecial (instrumental) methods for studying animals to verify the diagnosis - $PC\text{-}2_{ID\ -7}$Know the indications for using digital equipment andspecial (instrumental) and laboratory methods for studying animals in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - $PC\text{-}2_{ID\ -8}$Know the rules for safe work with digital equipment, instruments and equipment used when conducting special (instrumental) studies of animals, including when conducting x-ray studies - $PC\text{-}2_{ID\text{-}9}$Know the technique of conducting animal research withusing digital equipment and special (instrumental) methods in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - $PC\text{-}2_{ID\ -10}$Know the methods and techniques for administering diagnostic andradiopaque substances into the animal's body	10	-	2	-	4

4.	X-ray diagnostics of abdominal diseases cavities in different species animals Visibility and sighting radiography. Research methods using radiopaque agents (indications and contraindications). Determination of the exposure dose depending on the thickness and density of the organ. Normal and pathological radiographic appearance of the abdominal organs in small domestic animals. In the X-ray room at the clinic, practicing techniques for positioning and fixing small pets during X-ray diagnostics of the abdominal organs.	Able to develop animal research programs and conducting a clinical study of animals using special (instrumental) and laboratory methods, including to clarify the diagnosis (PC-2). - PC-2_{ID-1}Be able to study animals usingdigital equipment and using special (instrumental) methods, including endoscopy, probing, catheterization, radiography, electrocardiography, echography - PC-2_{ID-2}Be able to interpret and analyze dataspecial (instrumental) methods for studying animals to verify the diagnosis - PC-2_{ID-7}Know the indications for using digital equipment andspecial (instrumental) and laboratory methods for studying animals in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-2_{ID-8}Know the rules for safe work with digital equipment, instruments and equipment used when conducting special (instrumental) studies of animals, including when conducting x-ray studies - PC-2_{ID-9}Know the technique of conducting animal research withusing digital equipment and special (instrumental) methods in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-2_{ID-10}Know the methods and techniques for administering diagnostic andradiopaque substances into the animal's body	10	2	1	1	4

5.	Visibility and sighting radiography. Research methods using radiopaque agents (indications and contraindications). Determination of the exposure dose depending on the thickness and density of the organ. Normal and pathological radiographic picture of the abdominal organs in farm animals.	Able to develop animal research programs and conducting a clinical study of animals using special (instrumental) and laboratory methods, including to clarify the diagnosis (PC-2). - PC-2_{ID-1}Be able to study animals usingdigital equipment and using special (instrumental) methods, including endoscopy, probing, catheterization, radiography, electrocardiography, echography - PC-2_{ID-2}Be able to interpret and analyze dataspecial (instrumental) methods for studying animals to verify the diagnosis - PC-$2_{ID\ -7}$Know the indications for using digital equipment andspecial (instrumental) and laboratory methods for studying animals in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-$2_{ID\ -8}$Know the rules for safe work with digital equipment, instruments and equipment used when conducting special (instrumental) studies of animals, including when conducting x-ray studies - PC-2_{ID-9}Know the technique of conducting animal research withusing digital equipment and special (instrumental) methods in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-$2_{ID\ -10}$Know the methods and techniques for administering diagnostic andradiopaque substances into the animal's body	10	-	1	-	4

6.	X-ray diagnosis of chest diseases cavities in different species animals. Survey and targeted radiography. Research methods using radiopaque agents (indications and contraindications). Determination of the exposure dose depending on the thickness and density of the organ. Methods for studying the lungs, heart, large vessels and diaphragm. Normal and pathological radiographic picture of the chest organs. In the X-ray room at the clinic, practicing techniques for positioning and fixing animals for X-ray diagnostics of the chest organs.	Able to develop animal research programs and conducting a clinical study of animals using special (instrumental) and laboratory methods, including to clarify the diagnosis (PC-2). - PC-2_{ID-1}Be able to study animals usingdigital equipment and using special (instrumental) methods, including endoscopy, probing, catheterization, radiography, electrocardiography, echography - PC-2_{ID-2}Be able to interpret and analyze dataspecial (instrumental) methods for studying animals to verify the diagnosis - PC-2_{ID-7}Know the indications for using digital equipment andspecial (instrumental) and laboratory methods for studying animals in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-2_{ID-8}Know the rules for safe work with digital equipment, instruments and equipment used when conducting special (instrumental) studies of animals, including when conducting x-ray studies - PC-2_{ID-9}Know the technique of conducting animal research withusing digital equipment and special (instrumental) methods in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-2_{ID-10}Know the methods and techniques for administering diagnostic andradiopaque substances into the animal's body	10	2	1	1	6

7.	X-ray picture of the axial and peripheral skeleton in normal and pathological conditions in different animal species	Able to develop animal research programs and conducting a clinical study of animals using special (instrumental) and laboratory methods, including to clarify the diagnosis (PC-2). - PC-2_{ID-1}Be able to study animals usingdigital equipment and using special (instrumental) methods, including endoscopy, probing, catheterization, radiography, electrocardiography, echography - PC-2_{ID-2}Be able to interpret and analyze dataspecial (instrumental) methods for studying animals to verify the diagnosis - PC-$2_{ID\ -7}$Know the indications for using digital equipment andspecial (instrumental) and laboratory methods for studying animals in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-$2_{ID\ -8}$Know the rules for safe work with digital equipment, instruments and equipment used when conducting special (instrumental) studies of animals, including when conducting x-ray studies - PC-2_{ID-9}Know the technique of conducting animal research withusing digital equipment and special (instrumental) methods in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-$2_{ID\ -10}$Know the methods and techniques for administering diagnostic andradiopaque substances into the animal's body	10	2	1	-	4

8.	X-ray picture is normal and pathologies of the skull in different species animals In the X-ray room at the clinic, practicing techniques for positioning and fixing animals when taking images of the head area	Able to develop animal research programs and conducting a clinical study of animals using special (instrumental) and laboratory methods, including to clarify the diagnosis (PC-2). - PC-2_{ID-1}Be able to study animals usingdigital equipment and using special (instrumental) methods, including endoscopy, probing, catheterization, radiography, electrocardiography, echography - PC-2_{ID-2}Be able to interpret and analyze dataspecial (instrumental) methods for studying animals to verify the diagnosis - PC-$2_{ID\ -7}$Know the indications for using digital equipment andspecial (instrumental) and laboratory methods for studying animals in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-$2_{ID\ -8}$Know the rules for safe work with digital equipment, instruments and equipment used when conducting special (instrumental) studies of animals, including when conducting x-ray studies - PC-2_{ID-9}Know the technique of conducting animal research withusing digital equipment and special (instrumental) methods in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-$2_{ID\ -10}$Know the methods and techniques for administering diagnostic andradiopaque substances into the animal's body	10	-	1	1	4

9.	X-ray picture is normal and spinal pathologies from different species of animals. Method of obtaining images of the neck and withers area In the X-ray room at the clinic, practicing techniques for positioning and fixing animals when obtaining images of the spine area.	Able to develop animal research programs and conducting a clinical study of animals using special (instrumental) and laboratory methods, including to clarify the diagnosis (PC-2). - PC-2_{ID-1}Be able to study animals usingdigital equipment and using special (instrumental) methods, including endoscopy, probing, catheterization, radiography, electrocardiography, echography - PC-2_{ID-2}Be able to interpret and analyze dataspecial (instrumental) methods for studying animals to verify the diagnosis - PC-$2_{ID\ -7}$Know the indications for using digital equipment andspecial (instrumental) and laboratory methods for studying animals in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-$2_{ID\ -8}$Know the rules for safe work with digital equipment, instruments and equipment used when conducting special (instrumental) studies of animals, including when conducting x-ray studies - PC-2_{ID-9}Know the technique of conducting animal research withusing digital equipment and special (instrumental) methods in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-$2_{ID\ -10}$Know the methods and techniques for administering diagnostic andradiopaque substances into the animal's body	10	-	1	1	6

10.	X-ray diagnostics of bone and joint diseases. Technique for photographing various areas of the osteoarticular apparatus. Technique for imaging limbs in large animals. Use of auxiliary stands. Aero arthrography technique.	Able to develop animal research programs and conducting a clinical study of animals using special (instrumental) and laboratory methods, including to clarify the diagnosis (PC-2). - PC-2_{ID-1}Be able to study animals usingdigital equipment and using special (instrumental) methods, including endoscopy, probing, catheterization, radiography, electrocardiography, echography - PC-2_{ID-2}Be able to interpret and analyze dataspecial (instrumental) methods for studying animals to verify the diagnosis - PC-2_{ID-7}Know the indications for using digital equipment andspecial (instrumental) and laboratory methods for studying animals in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-2_{ID-8}Know the rules for safe work with digital equipment, instruments and equipment used when conducting special (instrumental) studies of animals, including when conducting x-ray studies - PC-2_{ID-9}Know the technique of conducting animal research withusing digital equipment and special (instrumental) methods in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-2_{ID-10}Know the methods and techniques for administering diagnostic andradiopaque substances into the animal's body	10	-	1	-	4

11.	Local and general structural changes in diseases bones. X-raysigns of fractures and cracks. X-ray changes articular cracks atdiseases joints. Dysplasia hip joints. Dislocations and subluxations. Reading and recording of radiographs	Able to develop animal research programs and conduct clinical studies of animals using special (instrumental) and laboratory methods, including to clarify the diagnosis (PC-2). - PC-2_{ID-1}Be able to study animals usingdigital equipment and using special (instrumental) methods, including endoscopy, probing, catheterization, radiography, electrocardiography, echography - PC-2_{ID-2}Be able to interpret and analyze dataspecial (instrumental) methods for studying animals to verify the diagnosis - PC-$2_{ID\ -7}$Know the indications for using digital equipment andspecial (instrumental) and laboratory methods for studying animals in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-$2_{ID\ -8}$Know the rules for safe work with digital equipment, instruments and equipment used when conducting special (instrumental) studies of animals, including when conducting x-ray studies - PC-2_{ID-9}Know the technique of conducting animal research withusing digital equipment and special (instrumental) methods in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-$2_{ID\ -10}$Know the methods and techniques for administering diagnostic andradiopaque substances into the animal's body	10	-	1	-	6
	TOTAL FOR SEMESTER 10			**8**	**12**	**4**	**48**

6. LIST OF EDUCATIONAL AND METHODOLOGICAL SUPPORT FOR INDEPENDENT WORK OF STUDENTS

6.1. Literature for independentwork

1. Workshop on private surgery: textbook / A.A. Stekolnikov, B.S. Semenov, O.K. Suhovolsky, E.I. Veremey. — St. Petersburg: Lan, 2021. — 352 p. — URL: https://e.lanbook.com/book/168602 (date of access: 04/27/2024). — Access mode: for authorization of users of the Lan EBS.

7. LIST OF BASIC AND ADDITIONAL LITERATURE REQUIRED FOR MASTERING THE DISCIPLINE

a) basic literature:

1. Stekolnikov,A.A. X-ray diagnostics in veterinary medicine / A.A. Stekolnikov, S.P. Kovalev, M.A. Narusbaeva. - St. Petersburg: SpetsLit, 2016.- 375 p.

2. Shakurov, M.Sh. Fundamentals of general veterinary surgery: textbook / M.Sh. Shakurov. - 3rd ed., erased. - St. Petersburg: Lan, 2020. - 252 p. - URL: https://e.lanbook.com/book/143118 (date of access: 04/27/2024). Access mode: for authorization of users of the Lan EBS.

3. Workshop on private surgery: textbook / A.A. Stekolnikov, B.S. Semenov, O.K. Suhovolsky, E.I. Veremey. - St. Petersburg: Lan, 2021. - 352 p. - URL:https://e.lanbook.com/book/211412 (date of access: 04/27/2024). Access mode: for authorization of users of the Lan EBS.

b) additional literature:

1. Workshop on general and private veterinary surgery: a textbook for university students specializing in "Veterinary Medicine" / A. V. Lebedev [etc.]; edited by B.S. Semenov. - Moscow: Kolos, 2000. - 536 pp.: ill. - (Textbooks and study guides for students of higher educational institutions).
2. Clinical diagnostics with radiology: textbook / E.S. Voronin [etc.]; edited by E.S. Voronina. - Moscow: KolosS, 2006. - 509 p.: ill. - (Textbooks and teaching aids for university students)..

8. LIST OF INFORMATION AND TELECOMMUNICATION RESOURCESNETWORKS "INTERNET" REQUIRED FOR MASTERING THE DISCIPLINE

To prepare for practical classes and perform independent work, students can use the following Internet resources:

1. https://meduniver.com – Medical information site.
2. http://operabelno.ru – Main surgical portal.

Electronic library systems:

1. EBS "SPBGUVM"
2. EBS "Publishing house "Lan"
3. EBS "Student Consultant"
4. Legal reference"Consultant Plus" system
5. University information system "RUSSIA"
6. Full text database POLPRED.COM
7. Scientific electronic library ELIBRARY.RU
8. Russian Scientific Network
9. Electronic library system IQlib
10. Web of Science International Science Citation Index Database
11. Full-text interdisciplinary database for agricultural and environmental sciences ProQuest AGRICULTURAL AND ENVIRONMENTAL SCIENCE DATABASE
12. Publisher's e-books"Prospekt Nauki" http://prospektnauki.ru/ebooks/
13. Collection "Rural farming. Veterinary" publishing houses "Quadro"http://www.iprbookshop.ru/586.html

9. METHODOLOGICAL INSTRUCTIONS FOR STUDENTS ON MASTERING THE DISCIPLINE

Methodological recommendations for students are the set of recommendations and explanations that allow the student to optimally organize the process of studying this discipline.

The content of methodological recommendations, as a rule, may include:

- Tips for planning and organizing the time needed to study the discipline. Description of the sequence of student actions, or "scenario for studying the discipline."

The morning time is the most fruitful for educational work (from 8-14 o'clock), then the afternoon (from 16-19 o'clock) and the evening time (from 20-24 o'clock). The most difficult material is recommended to be studied at the beginning of each time interval after rest. After 1.5 hours of work, a break (10-15 minutes) is required; after 4 hours of work, the break should be 1 hour. Part of the scientific organization of labor is mastering the technique of mental work. Normally, a student should devote about 10 hours a day to studying (6 hours at the university, 4 hours at home).

- Recommendations for working on lecture material When preparing for a lecture, the student is recommended to:

1) review the recordings of the previous lecture and recall previously studied material in memory;

2) useful to review and upcoming material for a future lecture;

3) if independent study of individual fragments of the topic of the last lecture is assigned, then it must be completed without delay;

4) prepare yourself psychologically for the lecture.

This work includes two main stages: taking notes of lectures and subsequent work on lecture material.

Note-taking means drawing up notes, i.e. a brief written statement of the content of something (oral presentation - speech, lecture, report, etc. or a written source - document, article, book, etc.).

The method of work when taking notes on oral presentations differs significantly from the method of work when taking notes from written sources.

By taking notes from written sources, the student has the opportunity to repeatedly read the desired passage of text, reflect on it, highlight the main thoughts of the author, briefly formulate them, and then write them down. If necessary, he can also note his attitude to this point of view. While listening to a lecture, the student must put off most of the above-mentioned work for another time, trying to use every minute to record the lecture, and not to comprehend it - there is no time left for this. Therefore, when taking notes from a lecture, it is recommended to separate fields on each page for subsequent entries in addition to the notes.

After recording a lecture or taking notes, you should not leave work on the lecture material until you begin preparing for the test. It is necessary to do as early as possible the work that accompanies note-taking of written sources and which was not possible to do while recording the lecture - read your notes, deciphering individual abbreviations, analyze the text, establish logical connections between its elements, in some cases show them graphically, highlight main thoughts, note issues that require additional processing, in particular, teacher consultation.

When working on the text of a lecture, the student needs to pay special attention to the problematic questions posed by the teacher when giving the lecture, as well as to his assignments and recommendations.

For Each lecture, practical lesson and laboratory work is given a number, topic, list of issues covered, volume in hours and links to recommended literature. For classes conducted in interactive forms, their organizational form must be indicated: computer simulation, business or role-playing game, analysis of a specific situation, etc.

- Recommendations for preparing for practical classes

Practical (seminar) classes constitute an important part of students' professional training. The main goal of conducting practical (seminar) classes is to develop analytical, creative thinking in students by acquiring practical skills. Practical classes are also conducted with the aim of deepening and consolidating the knowledge gained at lectures and in the process of independent work on regulatory documents, educational and scientific literature. When preparing for a practical lesson for students, it is necessary to study or repeat theoretical material on a given topic.

When preparing for a practical lesson, the student is recommended to adhere to the following algorithm;

1) get acquainted with the plan of the upcoming lesson;

2) study the literature sources that were recommended and familiarize yourself with the introductory notes to the relevant sections.

Methodological instructions for practical (seminar) classes in the discipline, along with the work program and schedule of the educational process, refer to methodological documents that determine the level of organization and quality of the educational process.

The content of practical (seminar) classes is recorded in the working curriculum of the disciplines in the sections "List of topics for practical (seminar) classes."

The most important component of any form of practical training is assignments. Basis in the task

- an example that is analyzed from the perspective of the theory developed in the lecture. As a rule, the main attention is paid to the formation of specific skills, which determines the content of students' activities
- problem solving, laboratory work, clarification of categories and concepts of science, which are a prerequisite for correct thinking and speech.

Practical (seminar) classes perform the following tasks:

- stimulate regular study of recommended literature, as well as attentive attention to the lecture course;
- consolidate the knowledge gained in the process of lecture training and independent work on literature;
- expand the volume professionally significant knowledge, skills, abilities;
- allow you to check the correctness of previously acquired knowledge;
- instill independent thinking skills, oral presentation;
- promote free operating with terminology;
- provide to the teacher opportunity systematically control level independent work of students.

Methodological instructions for practical (seminar) classes in the discipline should be focused on modern business conditions, current regulatory documents, advanced technologies, on the latest achievements of science, technology and practice, on modern ideas about certain phenomena and the reality being studied.

• Recommendations for working with literature.

Working with literature is an important stage of a student's independent work in mastering a subject, contributing not only to consolidation of knowledge, but also to broadening his horizons, mental abilities, memory, ability to think, present and confirm his hypotheses and ideas. In addition, research skills necessary for future professional activities are developed.

When starting to study literature on a topic, it is necessary to make notes, extracts, and notes. It is imperative to take notes on the works of theorists, which allow one to comprehend the theoretical basis of the study. For the rest, you can limit yourself to extracts from studied sources. All extracts and quotations must have an exact "return address" (author, title of work, year of publication, page, etc.). It is advisable to write an abbreviated name of the question to which the extract or quotation relates. In addition, it is necessary to learn how to immediately compile a card index of specialized literature and publications of sources, both proposed by the teacher and identified independently, as well as refer to bibliographic reference books, chronicles of journal articles, book chronicles, and abstract journals. In this case, publications of sources (articles, book titles, etc.) should be written on separate cards, which must be filled out in accordance with the rules of bibliographic description (surname, initials of the author, title of work. Place of publication, publisher, year of publication, number of pages, and for journals articles – journal name, year of publication, page numbers). On each card, it is advisable to record the thought of the author of the book or a fact from this book on only one specific issue. If the work, even in the same paragraph or phrase, contains further judgments or facts on another issue, then they should be written out on a separate card. The presentation should be concise, accurate, without subjective assessments. On the back of the card you can make your own notes about this book or article, its contents, structure, what sources it was written on, etc.

• Explanations about working with test materials for the course, recommendations for completing homework.

Testing allows you to determine whether the actual behavior of the program corresponds to the expected behavior by performing a specially selected set of tests. A test is the fulfillment of certain conditions and actions necessary to verify the operation of the function being tested or its part. Each question in the discipline must be answered correctly by choosing one option.

10. EDUCATIONAL WORK

As part of the implementation of the discipline, educational work for the formation of a modern scientific worldview and a system of basic values, the formation and development of spiritual, moral, civil and patriotic values, a system of aesthetic and ethical knowledge and values, attitudes of tolerant consciousness in society, the formation in students of the need for work as the first necessity of life, the highest values and the main way to achieve success in life, to understand the social significance of your future profession.

11. LIST OF INFORMATION TECHNOLOGIES USED IN THE EDUCATIONAL PROCESS

11.1. The educational process in the discipline provides for the use of information technologies:

- ✓ conducting practical classes using multimedia;
- ✓ interactive technologies (conducting dialogues, collective discussion of various approaches to solving a particular educational and professional problem);
- ✓ interaction with students via email;
- ✓ joint Job V Electronic information and educational environment SPbGUVM:https://spbguvm.ru/academy/eios

11.2. Software

List of licensed and freely distributed software, including domestically produced ones

No.	Name of recommended sections and topics technical and computer training programs	License
1	MS PowerPoint	67580828
2	Libre Office	free software
3	OS Alt Education 8	AAO.0022.00
4	ABIS "MARK-SQL"	02102014155
5	MS Windows 10	67580828
6	System ConsultantPlus	503/KL
7	Android OS	free software

12. MATERIAL AND TECHNICAL BASE REQUIRED FOR THE IMPLEMENTATION OF THE EDUCATIONAL PROCESS IN THE DISCIPLINE

Name of discipline (module), practice in compliance with curriculum	**Name of special premises and premises for independent work**	**Equipping special rooms and rooms for independent work**
Veterinary radiology	113 (196084, St. Petersburg, Chernigovskaya str., building 5) Classroom for conducting seminar-type classes, group and individual consultations, ongoing monitoring and intermediate certification	*Specialized furniture:* desks, chairs, blackboard, visual aids and educational materials: anatomical models for radiology, technical teaching aids: multimedia projector, screen, laptop. System for digital radiography. Collection of radiographs on lesson topics
	206 Large reading room (196084, St. Petersburg, Chernigovskaya str., building 5) Room For independentwork	*Specialized furniture*: tables, chairs *Technical facilities training:* computers with network connection "Internet" and access to the electronic information and educational environment
	214 Small reading room (196084, St. Petersburg, st. Chernigovskaya, house 5) Room For independent work	*Specialized furniture:* tables, chairs *Technical facilities training:* computers with network connection "Internet" and access to the electronic information and educational environment
	324 Department of Information Technologies (196084, St. Petersburg, Chernigovskaya str., building 5) Room for storage and preventive maintenance of educational equipment	*Specialized furniture* tables, chairs, special equipment, materials and spare parts for preventive service technical training aids

Developers:
Head of the Department of General, Private and Operative surgery A.Yu Nechaev
Doctor of Veterinary Medicine, Docent

Annex 1

Ministry of Agriculture of the Russian Federation
Federal State Budgetary Educational Institution
of higher education
"Saint Petersburg State University of Veterinary Medicine"

Department of General, Private and Operative surgery

FUND OF ASSESMENT TOOLS
for the discipline
"VETERINARY RADIOLOGY"

Level of higher education
SPECIALIST COURSE

Specialty 36.05.01 Veterinary medicine
Full-time education

Education starts in 2024

Saint Petersburg
2024

1. PASSPORT OF THE ASSESSMENT FUND

Table 1

No.	Molded competencies	Controlled sections (topics) disciplines	Evaluation tool
1.	PC-2 Capable develop animal research programs and conduct clinical studies of animals using special (instrumental) and laboratory methods, including to clarify the diagnosis. - PC-2_{ID-1} Be able to produce studyanimals using digital equipment and using special (instrumental) methods, including endoscopy, probing, catheterization, radiography, electrocardiography, echography - PC-2_{ID-2} Be able to implementinterpretation and analysis of data from special (instrumental) animal research methods to verify the diagnosis - PC-2_{ID} -$_7$Know the indications for usedigital equipment and special (instrumental) and laboratory methods for studying animals in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-2_{ID} -$_8$Know the rules of safe workwith digital equipment, tools and equipment used in conducting special (instrumental) research animals, including during X-ray examinations - PC-2_{ID-9}Know the techniqueanimal research using digital equipment and special (instrumental) methods in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals - PC-2_{ID} -$_{10}$Know methods and techniquesintroduction diagnostic and radiopaque substances into the animal's body	Introduction to Veterinary Radiology. Nature and properties of X-rays. Qualitative and quantitative characteristics of X-rays. X-ray diagnostic methods (fluoroscopy and radiography).	Tests
2.		X-ray diagnostic units and attachments to them (classification, characteristics and principles of working with them). Safety rules for working in the radiology room and handling x-rays equipment. Personal means of protection against radiation.	Tests
3.		Methods of typical placement of animals depending on the subject of photography in frontal, lateral and oblique projections. X-ray shooting conditions.	Tests
4.		X-ray diagnostics of diseases of the abdominal organs in different animal species Methods for laying and fixing small household items animals during X-ray diagnostics of the abdominal organs. Survey and targeted radiography. Research methods using radiopaque agents (indications and contraindications). Determination of the exposure dose depending on the thickness and density of the organ. Normal and pathological radiographic appearance of the abdominal organs in small domestic animals	Tests
5.		Methods for placing and fixing farm animals during X-ray diagnostics of the abdominal organs. Survey and targeted radiography. Research methods using radiopaque agents (indications and contraindications). Determination of the exposure dose depending on the thickness and density of the organ. Normal and pathological radiographic picture of the abdominal organs in animals	Tests
6.		X-ray diagnosis of diseases of the thoracic cavity in different animal species. Methods for positioning and fixing animals during X-ray diagnostics of the thoracic organs. Survey and targeted radiography. Research methods using radiopaque agents (indications and contraindications). Determination of the exposure dose depending on the thickness and density of the organ. Methods for studying the lungs, heart, large vessels and diaphragm. Normal and pathological radiographic picture of the chest organs.	Tests
7.		X-ray picture of the axial and peripheral skeleton in normal and pathological conditions in different species animals	Tests
8.		X-ray picture in normal and pathological conditions of the skull in different animal species Method of obtaining images of the head area	Tests
9.		X-ray picture in normal and pathological conditions spine in different animal species. Method of obtaining images of the neck and withers area	Tests
10.		X-ray diagnostics of bone and joint diseases. Technique for photographing various areas of the osteoarticular apparatus. Technique for imaging limbs in large animals. Using auxiliary stands. Aeroarthrography technique.	Tests

11.		Viewing radiographs on a X-ray viewer. Local and general structural changes in bone diseases. X-ray signs of fractures and cracks. Changes in X-ray joint space in joint diseases. Hip dysplasia. Dislocations and subluxations. Reading and recording of radiographs	Tests

Approximate list of assessment tools

table 2

No.	Name of the assessment facilities	Brief description of the evaluation tool	Presentation of the evaluation tool in the fund
1.	Test	A system of standardized tasks that allows you to automate the procedure measuring the level of knowledge and skills of the student	Test task fund
2.	Test	A tool for testing the ability to apply acquired knowledge to solve problems of a certain type on a topic or section	Set of control tasks for options

3. INDICATORS AND CRITERIA FOR ASSESSING COMPETENCIES AT THEIR VARIOUS STAGES

Table 3

Planned development of results competencies	Mastery level				Evaluation tool
	unsatisfactory	satisfactorily	Fine	Great	
Able to use basic knowledge of natural sciences in analyzing the patterns of structure and functioning of organs and organ systems, generally accepted and modern research methods for diagnosis and treatment and preventive activities based on humane treatment of animals (PC-2)					
PC-2 ID-1 Be able to produce animal research using digital equipment And With using special (instrumental) methods, including number endoscopy, sensing,catheterization, radiography, electrocardiography, echography	The level of knowledge is below the minimum requirements, there have been rude errors	Minimum acceptable level of knowledge, a lot is allowed minor mistakes	Level of knowledge in the amount corresponding to the program preparation, a few minor mistakes were made	Level of knowledge in the amount corresponding to the program preparation, without errors.	Test
PC-2 ID- 2 Be able to realize interpretation Andanalysis data special (instrumental) animal research methods for diagnosis verification	The level of knowledge is below the minimum requirements, there were serious errors	Minimum acceptable level of knowledge, many minor mistakes were made	Level of knowledge in the amount corresponding to the training program, Several minor mistakes were made	Level of knowledge in the amount corresponding to the training program, without errors	Test

PC-2ID-7Know the indications for use digitalequipment Andspecial (instrumental) and laboratory methods research animals Vin accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals	Basic skills are not demonstrated when solving standard problems, there were serious mistakes	Demonstrated basic skills, solved standard problems with non-rough errors, all tasks completed, but not in full	Demonstratedall major skills, all basic problems with non-rough ones have been solved errors, all tasks were completed in full, but some with shortcomings	All the main ones are demonstrated skills, all main tasks with individual minor shortcomings, all tasks were completed in full	tests Test
PC-2ID -8Know the safety rulesworking with digital equipment, tools And equipment, used at carrying out special (instrumental) animal research, including when performing x-ray research	Basic skills were not demonstrated when solving standard problems; there were gross errors	Demonstrated basic skills, solved typical problems with minor errors, completed all tasks, but not in full	Demonstratedall major skills, all main tasks with minor errors have been solved, all tasks have been completed in full, but some with shortcomings	All the main ones are demonstrated skills, all main tasks with some minor shortcomings have been solved, all tasks have been completed in full	**Test**
PC-2ID-9Know the techniqueresearch animals With using digital equipment And special (instrumental) methods V compliance With methodical directions, instructions, rules diagnosis, prevention and treatment animals	Basic skills were not demonstrated when solving standard problems; there were gross errors	Demonstrated basic skills, solved typical problems with minor errors, completed all tasks, but not in full	Demonstratedall major skills, all main tasks with minor errors have been solved, all tasks have been completed in full, but some with shortcomings	All the main ones are demonstrated skills, all main tasks with some minor shortcomings have been solved, all tasks have been completed in full	Test
- PC-2ID -10Know methods and techniquesintroduction of diagnostic and radiopaque substances into the animal's body	Basic skills were not demonstrated when solving standard problems; there were gross errors	Demonstratedbasic skills, solved typical problems with minor errors, completed all tasks, but not in full	Demonstratedall major skills, all main tasks with minor errors have been solved, all tasks have been completed in full, but some with shortcomings	All the main ones are demonstrated skills, all main tasks with some minor shortcomings have been solved, all tasks have been completed in full	Test

4. LIST OF CHECK TASKS AND OTHER MATERIALS, KNOWLEDGE, ABILITIES, SKILLS AND EXPERIENCE REQUIRED FOR ASSESSMENT

4.1. Typical tasks for ongoing progress monitoring

4.1.1. Tests

Competency assessment tests:

PC-2 Able to develop animal research programs and conduct clinical studies of animals using special (instrumental) and laboratory methods, including to clarify the diagnosis.

PC-2 ID-1 Be able to study animals using digitalequipment and using special (instrumental) methods, including endoscopy, probing, catheterization, radiography, electrocardiography, echography

1. What is the most informative diagnostic method for spinal diseases?

1) MRI
2) CT
3) Ultrasound
4) X-ray diagnostics

2. What is a diagnostic method in which the study is carried out without radiation exposure to the patient?

1) MRI
2) CT
3) Ultrasound
4) X-ray diagnostics

3. What determines bone density on x-rays?

1) bone minerals
2) organic matter of bone tissue
3) water
4) Bone marrow

PC-2ID-2 Be able to interpret and analyze data from special (instrumental) animal research methods to verify the diagnosis

4. What is the main sign of chronic lung abscess?

1) rounded infiltrate
2) irregular cavity with sclerosis around
3) pleural adhesions (moorings)
4) bronchiectasis

5. What is characteristic of aseptic necrosis of the femoral head?

1) narrowing of the articular cleft-like formations in the head
2) cyst-like formations in the acetabulum
3) step-like deformation of the head contour

6. How are being judged o clarity radiographs chest cells Bycontours:

1) mediastinum,
2) aperture
3) great vessels
4) ribs

7. What is the most convincing symptom for recognizing bone fractures?

1) hardening of the bone structure
2) bone deformity
3) cortical break
4) line of enlightenment

8. What radiological symptom confirms mechanicalintervertebral disc damage?

1) expansion of the intervertebral space
2) narrowing of the intervertebral space
3) displacement of the presenting vertebra

2) narrowing of the intervertebral space
3) displacement of the presenting vertebra
4) enlargement of the intervertebral foramen

9. What is uncharacteristic of a pseudarthrosis?

1) smoothness and roundness of the ends of fragments
2) long-lasting gap between fragments
3) jagged ends of fragments
4) Thickening of the ends of fragments

10. When do limescale inclusions ("mice") occur in affected areas?

1) chondromatosis of the joint
2) osteogenesis imperfecta
3) joint dysplasia
4) Fracture in the joint area

11. How is bone sequestration characterized radiographically?

1) increased shadow intensity
2) decreasing shadow intensity
3) partial separation from the surrounding bone tissue
4) mandatory separation from the surrounding bone tissue along the entire length

12. What species animals typical flow exudativepleurisy?

1) horses
2) dogs
3) there is no right answer
4) cattle

PC-2ID -7 Know the indications for the use of digital equipment and special (instrumental) and laboratory methods for studying animals in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals

13. What way decrease dimensions Images atradiography compared to the size of the object?

1) photographing an object on the screen
2) decreasing the size of the focal spot
3) decreasing the object-film distance
4) increasing the focus-film distance

14. Which of the following symptoms indicates the secondary nature of arthrosis developing as a result of chronic arthritis:

1) subchondral osteosclerosis
2) marginal defects of articular surfaces
3) joint space narrowing
4) Subchondral surface defects

15. From what depend readings individual x-ray dosimeter?

1) duration of irradiation
2) radiation intensity
3) radiation power
4) Distances to tube

16. At what phase of the respiratory cycle should lung images be taken?

1) exhalation
2) inhale
3) not a full exhalation

4) doesn't matter

17. For what pathologies in the chest will we see the effect? "ground glass" on an x-ray?

1) emphysema;
2) obesity;
3) fluid in the pleural cavity;
4) pneumomediastinum;

18. What We at secondary food hyperparathyroidism We Not detectable on an x-ray?

1) depletion of the cortical layer of bones;
2) "green stick" bone fracture;
3) generalized osteopenia;
4) narrowing of the medullary canal;

19. What radiological sign is present in dogs with hydrocephalus?

1) "bone collar" in the metaphysis;
2) "finger impressions" of the cranial vault;
3) "level" of liquid;
4) diffuse pneumatization;

20. During excretory urography, at what minute do we detect a pyelogram in the image?

1) in the first minute;
2) at the fifth minute;
3) at the twentieth minute;
4) in one hour.

21. Which of the following substances cannot be used for contrasting the organs of the urinary system?

1) barium sulfate;
2) organic iodides;
3) omnipack;
4) carbon dioxide.

22. Which x-ray sign Maybe be observed at primary brain tumor?

1) frosted glass effect;
2) no;
3) lysis of skull bones;
4) "level" of liquid;

23. Which of the following structures is not visualized (normally) on lateral films of the abdominal cavity?

1) small intestine;
2) cecum;
3) gallbladder;
4) liver.

24. What radiological sign is pathognomonic for gastric volvulus?

1) Pneumatization of the small intestine;
2) single gas bubble in the stomach;
3) double gas bubble in the stomach;
4) free gas in the abdominal cavity.

25. How characteristic appearance in the photo of the vertebrae Vform "butterflies"?

1) congenital insufficient closure of the vertebral arches;

2) education sagittal cracks V result violations mergersleft and right ossification centers of the vertebra;

3) fusion of two adjacent vertebral bodies;

4) ventral curvature of the spine;

PC-2 ID -8 Know Rules safe work with digitalequipment, tools and equipment used in conducting special (instrumental) studies of animals, including when conducting x-ray studies

PC-2ID-9 Know the technique of conducting animal research using digital equipment and special (instrumental) methods in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals

26. What will we see in the picture in case of bronchial diseases?

1) Bronchogram

2) "bagels" and "tram rails"

3) "pieces of cotton wool"

4) "nodules"

27. At what pathological processes We Not we'll discover on pictures of bone tissue destruction?

1) osteosarcoma;

2) fracture;

3) bone tuberculosis;

4) osteomyelitis;

28. What do we not detect on an x-ray with spinal spondylosis?

1) exostoses in the form of bridges on the dorsal surface of the vertebral bodies;

2) exostoses V form jumpers on ventral surfaces tel vertebrae;

3) exostoses in the form of bridges in the area of intervertebral joints;

4) exostoses in the form of bridges in the lumen of the spinal canal;

29. In what area does the X-ray machine need to be focused for images of the caudal cervical spine?

1) C3 C4;

2) C4 – C5;

3) C5 – C6;

4) C6 – C7;

30. For what pathologies of the gastrointestinal tract will we visualize a defect in the filling of the small intestine in the image when examining with barium?

1) coprostasis;

2) small intestinal lymphoma;

3) acute enteritis;

4) foreign body in the stomach.

31. In what cases should X-ray examination be preferred over ultrasound diagnostics?

1) Detection of a pregnant uterus;

2) counting the number of fruits;

3) identification of viable fruits;

4) detection of uterine rupture.

32. What is not characterized by hypervitaminosis A in cats?

1) symmetrical education reactive bones V region large joints;

2) asymmetrical formation of reactive bone in the area of large joints;

3) education reactive bones V region cervical

departmentspine;

4) education reactive bones V region breast department spine;

33. Which anatomical structure impossible discover on X-ray of a dog's head in laterolateral projection?

1) frontal sinus;
2) maxillary sinus;
3) ethmoid bone;
4) palatine bone;

34. Which type periosteal reactions will dominate on X-ray for an aggressive form of osteosarcoma?

1) Codman visor;
2) "needle" periostitis;
3) "fringed" periostitis;
4) "layered" periostitis;

40.What should be considered the most effective research technique for anomalies of the aortic arch?

1). contrast study of the esophagus
2). fluoroscopy
3). radiography
4). tomography

PC-2 ID-10Know methods And technique introduction diagnostic and radiopaque substances into the animal's body

35. By what method can urate urinary stones be detected on an x-ray?

1) Positive contrast;
2) negative contrast;
3) double contrast;
4) excretory urography.

36. What color glasses should I use to speed up the process of shadow adaptation?

1). with yellow glasses 2). with red glasses 3). with green glasses 4). Without glasses

37. What Not applies For artificial contrasting V radiology?

1). inorganic iodine compounds 2). organic iodine compounds
3). inorganic calcium compounds 4). Barium sulfate

38. What is the purpose of radiography of the pharynx and esophagus in a lateral projection with a contrast agent?

1). tumors of the pharynx and esophagus 2). thyroid tumors 3). swallowing disorder
4). foreign bodies of the esophagus

39. How long does it take to take an x-ray of the esophagus after feeding barium mass?:

1) immediately after feeding
2) in 5 minutes
3) in 10 minutes
4) in 15 minutes

40. What applies For artificial contrasting Vradiology?

1) all of the following
2) organic iodine compounds
3) barium sulfate
4) gases (oxygen, nitrous oxide, carbon dioxide, atmospheric air)

6.2. Typical tasks for intermediate certification

6.2.1. Questions for testing

PC-2 Able to develop animal research programs and conduct clinical studies of animals using special (instrumental) and laboratory methods, including to clarify the diagnosis.

PC-2ID- 1 Be able to study animals using digital equipment and using special (instrumental) methods, including endoscopy, probing, catheterization, radiography, electrocardiography, echography

1. Nature and basic properties of x-rays.
2. Qualitative and quantitative characteristics of X-rays.
3. What are negative Andpositive sides biologicalaction of x-rays.
4. X-ray diagnostic methods. Advantages and disadvantages of fluoroscopy and radiography.
5. X-ray diagnostic units and attachments for them. Their classification and brief description.
6. Basic components of X-ray machines.
7. X-ray tubes, their device And principle generatingX-rays.
8. Preparation of animals for x-ray studies.
9. Basic rules for positioning animals during radiography.
10. What determines the choice of shooting projection?
11. List the main factors influencing the amount of exposure.
12. Design of X-ray cassettes, basic requirements for them.
13. Characteristics of luminescent intensifying screens, their main types.
14. The essence of the appearance of images on radiographs.
15. Necessary chemicals for radiography, their composition, rules for preparing working solutions, conditions for their use and storage.
16. Subsequence photochemical processing exposed films.

PC-2ID-2 Be able to interpret and analyze data from special (instrumental) animal research methods to verify the diagnosis

17. Principles of reading and recording radiographs.
18. Reasons for obtaining poor-quality radiographs.

PC-2ID -7 Know the indications for the use of digital equipment and special (instrumental) and laboratory methods for studying animals in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals

19. For what reasons, in case of traumatic injuries of bones and joints, radiography must be performed in two mutually perpendicular projections?
20. X-ray signs of fractures and cracks.
21. What are radiographic lines of clearing in fractures? What determine their size, intensity, quantity and character?
22. For what necessary know location zones growth at young animals?
23. What is a displacement shadow? In what units are they designated depending on the direction?
24. What components of the joints are not differentiated in a normal state on an x-ray?
25. What is the x-ray joint space and what can lead to a change in its thickness?
26. Indications for the use of aeroathrography.
27. The main radiographic signs of arthritis and arthrosis.
28. How conditioned two main sign V X-ray diagnosis of diseases of the lungs and pleura (shading and clearing)?
29. Indications and contraindications for the use of radiocontrast agents in studies of the

gastrointestinal tract.

PC-2ID -8 Know the rules for safe work with digital equipment, tools and equipment used when conducting special (instrumental) research on animals, including when conducting x-ray studies

32. History of the formation of domestic veterinary radiology. 33.Digital X-ray - technical aspects and capabilities of methods. 34.Technical capabilities of the computed tomography method.

35. Standard placement for radiography of small pets (cats, dogs).

36. Standard placement for radiography of large domestic animals (horses, cattle).

PC-2ID-9 Know the technique of conducting animal research using digital equipment and special (instrumental) methods in accordance with guidelines, instructions, rules for diagnosis, prevention and treatment of animals

37. X-ray classification of bone fractures.

38. X-ray diagnosis of bone tumors.

39. X-ray diagnostics in cardiology.

40. X-ray diagnostics in urology.

41. X-ray diagnosis of soft tissue tumors.

42. X-ray diagnostics diseases exotic animals (birds,reptiles, rodents, etc.).

43. Artifacts in radiology.

44. X-ray diagnosis of horse toe diseases.

45. X-ray diagnosis of diseases of the upper respiratory tract and lungs in horses

46. X-ray diagnostics of genetically determined diseases of dogs

47. Myelography of small domestic animals

48. X-ray diagnostics for laminitis (rheumatic inflammation of the hooves) in horses.

49. X-ray diagnosis of diseases of the horse's hock joint.

50. X-ray diagnosis of diseases of the horse's carpal joint.

PC-2ID -10 Know the methods and techniques of introducing diagnostic and radiopaque substances into the animal's body

51. Myelography of small domestic animals

52, Contrast agents for X-ray examination

53. Contrast study of the gastrointestinal tract

54. Angiography

55. Contrast study of the urinary system, excretory urography

7. METHODOLOGICAL MATERIALS DETERMINING PROCEDURES FOR ASSESSING KNOWLEDGE, ABILITIES AND SKILLS AND ACTIVITY EXPERIENCE CHARACTERIZING THE STAGES OF COMPETENCY FORMATION

Criteria assessments knowledge students at carrying out testing:

The test result is assessed on a percentage rating scale. Each student is offered a set of test tasks consisting of 25 questions:

- **Mark "excellent"**– 25-22 correct answers.
- **Mark "good"**– 21-18 correct answers.
- **Mark "satisfactory"** –17-13 correct answers.
- **Mark "unsatisfactory"**– less than 13 correct answers

Criteria for assessing students' knowledge when checking test papers:

- **Mark "excellent"**- the problem is identified and its relevance is justified; an analysis of various points of view on the problem under consideration was made and one's own position was logically stated; conclusions are formulated, the topic is fully disclosed, the scope is maintained; requirements for external design have been met, basic requirements for the abstract have been met

- **Mark "good"**- there were shortcomings. In particular, there are inaccuracies in the presentation of the material; there is no logical consistency in judgments; the volume of the abstract is not maintained; there are omissions in the design, there are significant deviations from the requirements for abstracting.
- **Mark "satisfactory"**- the topic is only partially covered; there were factual errors in the content of the abstract; there are no conclusions, the topic of the abstract is not disclosed
- **Mark "unsatisfactory"**- there is a significant misunderstanding of the problem or the abstract is not presented at all.

Knowledge criteria for the test:

- **Grade "passed"**must meet the parameters of any of the positive ratings ("excellent", "good", "satisfactory").
- **Grade "not accepted"**must comply with the assessment parameters "unsatisfactory"
- **Mark "excellent"**– all types of educational work provided for by the curriculum have been completed. The student demonstrates the correspondence of knowledge, skills and abilities to the indicators given in the tables, operates with acquired knowledge, skills and abilities, and applies them in situations of increased complexity. In this case, inaccuracies and difficulties may occur during analytical operations and the transfer of knowledge and skills to new, non-standard situations.
- **Mark "good"**– all types of educational work provided for by the curriculum have been completed. The student demonstrates the correspondence of knowledge, skills and abilities to the indicators given in the tables, operates with acquired knowledge, skills and abilities, and applies them in standard situations. In this case, minor errors, inaccuracies, and difficulties during analytical operations and the transfer of knowledge and skills to new, non-standard situations may be made.
- **Mark "satisfactory"**– one or more types of educational work provided for by the curriculum have not been completed. The student demonstrates incomplete compliance of knowledge, abilities, skills with the indicators given in the tables, significant mistakes are made, a partial lack of knowledge, abilities, and skills is manifested in a number of indicators, the student experiences significant difficulties in operating knowledge and skills when transferring them to new situations. –
- **Mark "unsatisfactory"**– the types of educational work provided for by the curriculum have not been completed. demonstrates incomplete compliance of knowledge, abilities, and skills with those given in the tables of indicators, significant errors are made, a lack of knowledge, abilities, and skills is manifested in a larger number of indicators; the student experiences significant difficulties in operating knowledge and skills when transferring them to new situations

6. ACCESSIBILITY AND QUALITY OF EDUCATION FOR PERSONS WITH DISABILITIES

If necessary, disabled people and persons with limited health capabilities are given additional time to prepare an answer for the test.

When carrying out the procedure for assessing the learning outcomes of people with disabilities and people with limited health capabilities, their own technical means may be used.

The procedure for assessing the learning outcomes of people with disabilities and people with limited health capabilities in the discipline provides for the provision of information in forms adapted to the limitations of their health and perception of information:

For people with visual impairments:	– V printed form enlargedfont, – in the form of an electronic document.
For people with hearing impairments:	– in printed form, – in the form of an electronic document.
For persons with disabilities musculoskeletal system	– in printed form, apparatus: – in the form of an electronic document.

When carrying out the procedure for assessing the learning outcomes of disabled people and persons with limited health capabilities in the discipline, it ensures the fulfillment of the following additional

requirements depending on the individual characteristics of the students:
a) instructions on the procedure for conducting the assessment procedure are provided in an accessible form (orally, in writing);
b) an accessible form for submitting assignments of assessment tools (in printed form, in printed form in enlarged font, in the form of an electronic document, assignments are read out by the teacher);
c) an accessible form of providing answers to assignments (written on paper, typing answers on a computer, orally).
If necessary, for students with disabilities and people with disabilities, the procedure for assessing learning outcomes in the discipline can be carried out in several stages.
The procedure for assessing the learning outcomes of disabled people and persons with limited health capabilities is permitted using distance learning technologies.